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ABSTRACT

Three local norm methods for deriving Elementary Secondary Education Act Title I normal curve equivalent (NCE) gains are compared to each other and to the usual Model A1 which uses national norms. The 1977-78 Title I evaluation data for Chicago students ages 9-13 were used to estimate gains. Reading and total math scores from the 1971 Iowa Tests of Basic Skills (ITBS), and the 1972 ITBS Primary Battery were used. The 1977 ITBS special NCE norms were used in Model A1. Matched pre- and posttest scores were available for 18,758 students in reading and 18,533 students in math. Gains were derived from each of the four methods for each of the specified age groups and separately for those students scoring above and below the national 10th percentile. Comparison of scores for students with national norms showed that more than 60% of the students at each age level were at or below the national 10th percentile in reading, and more than 75% at each age level were at or below the national 10th percentile in math. For all ages except 13, the standard A1 method showed smaller gains than the local norm methods. For ages 9-11, the A1 national norm gains were negative. (RL)

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LOCAL NORMS IN A LARGE URBAN SETTING FOR EVALUATING TITLE I PROGRAMS WITH MODEL A 1

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Local Norms in a Large Urban Setting for Evaluating Title I Program with Model A 1

A special problem in the evaluation of Title I impact arises when the expected performance of Title I students is not accurately described by national test norms. When this situation exists, estimates of Title I gains will be distorted by the usual A 1 evaluation model since this model uses national norms to specify performance expected without the influence of Title I. To the extent that nationally derived expected performance overestimates anticipated learning from the regular school curriculum, Title I gains will be underestimated. In addition, if Title I students perform at or below the national first percentile, gains derived by model A 1 will be zero regardless of Title I impact since nationally standardized scales are not able to describe changes in the performance of these students. Local norms, when they exist, provide a more realistic estimate of expected learning that can be used in deriving Title I gains. The purpose of this paper is to empirically compare three local norm methods for deriving Title I gains when local performance expectations are different from those of a national norm group.

The Title I population in Chicago, Illinois provides an example of the situation described above. Chicago Board of Education (CBE) comparisons of local reading scores on the Iowa Tests of Basic Skills (ITBS) with national ITBS norms revealed that 70 to 80 percent of Chicago students scored below the national 50th percentile and that 10 to 20 percent of the Chicago students, age 9 and above, scored below the national first percentile. CBE staff indicated that at some age levels a substantial percentage of Title I students were at or below the first percentile.[1] Two consequences of this situation, in particular, influence the evaluation of Title I. The first is that on-grade level tests are likely to be too difficult for Chicago students and result in floor effects. The second consequence is that expected growth during a school year, as shown by ITBS test norms, is likely to be considerably different from growth demonstrated by the Chicago student population. The methods for computing Title I gains which are compared in this paper have been suggested, in part, by CBE efforts to overcome these problems in the evaluation of Title I. To combat these problems, CBE instituted functional level testing and developed local norms.

The CBE introduced functional level testing, using the Iowa Tests of Basic Skills, on a city-wide basis in the spring of 1975 in response to the large proportion of Title I students performing at or near chance levels. Prior to this change, on-grade level tests led to demonstrated Title I gains that were about the same as the gains expected from chance level performance. The use of functional level tests in place of on-grade level tests was successful in

reducing the number of students performing at chance levels in reading from 38 percent in 1974 to 9 percent in 1975, and 8 percent in 1976.[2] Because the floor effect for Title I students was greatly reduced, test scores could be interpreted as a measure of actual achievement rather than chance performance.

Local norms were developed for the functional level tests for each age cycle, to provide a standard of expected performance for students in Chicago schools. CBE policy uses age, rather then grade level, to identify cohorts of students. Local norms were based on the following standardized score. For each age cycle, z scores for 30,000 to 35,000 students were computed according to the formula:

$$z = \frac{\text{Student's GE - Mean GE (for student's age cycle)}}{\text{SD (for student's age cycle)}}$$

These z scores were then transformed to Chicago Standard Scores (CSS) according to the formula

$$CSS = 250 + 21.06\ (z).$$

Chicago Standard Scores are essentially locally derived NCE's with a mean of 250 instead of 50.

These norms are suitable for use in Title I evaluation in Chicago since they provide a local expectation for regular school performance. However, because of the national perspective of Title I evaluation, Title I gains must be expressed in the common NCE metric for purposes of aggregation. National NCE gains can be derived when local norms are used in combination with the standard deviation of a nationally representative sample. Procedures to do this have been outlined by the RMC Research Corporation in the Title I User's Guide.[3] However, since CSS are expressed in a local NCE metric, there may be little difference between using CSS or the prescribed local norm procedures. The approaches for using local norms in deriving Title I gains are described below.

Method 1: The Local Norm (SD_N Known) Method

RMC developed this local norm procedure for tests which have both local and national norms. Gains attributed to Title I are derived through use of the formula [4]

$$TE = \frac{O_{SS} - E_{SS}}{SD_N} \times 21.06$$

where

TE = Treatment effect
O_{SS} = the observed posttest score expressed in publisher's standard score metric

E_{SS} = the expected posttest score, expressed in the publisher's standard score metric

SD_N = the standard deviation of the national norm group, expressed in the publishers standard score metric

The primary advantage of the Local Norm (SD_N Known) Method is that local norms may be used to determine expected posttest performance while gains are expressed in the national NCE metric. In keeping with Model A 1 the pretest percentile is used to locate that score in the posttest norms which is assumed to indicate the level of performance expected without the influence of Title I. Title I gains are considered to be the difference between observed and expected performance. These gains are expressed on the NCE scale when they are divided by the standard deviation of the national norming group and multiplied by 21.06, the standard deviation of the NCE scale.

The Local Norm (SD_N Known) Method employs the standard score metric of the test which has both local and national norms. ITBS grade equivalents were used in this study since they are the standard scores used by the CBE to determine Chicago Standard Scores. It is noted that ITBS grade equivalent scores are expanded scale scores containing many of the features of expanded scale scores advocated by RMC for use with functional level testing. In addition, the pre-to-posttest interval in Chicago is a full year. This eliminates concern for irregularity in growth during a school year, a weakness of many grade equivalent scales.

Method 2: The Local Norm (SD_N Estimated) Method

Method 2 is the RMC procedure designed for use with tests that have only local norms. A second test must be administered in order to estimate the standard deviation of a nationally representative sample on the local test. When this is done, Title I gains can be expressed in the NCE metric through the formula 5

$$TE = \frac{O_{CSS} - E_{CSS}}{(SD_N \times SD_{TCSS})/SD_{TN}} \times 21.06$$

where

O_{CSS} = the observed posttest performance, expressed as a Chicago Standard Score

E_{CSS} = the expected posttest performance, expressed as a Chicago Standard Score

SD_{TN} = the standard deviation of the treatment group on a nationally normed test, expressed in the publisher's standard score metric

SD_{TCSS} = the standard deviation of the treatment group in the CSS metric.

Method 2 is similar to the Local Norm (SD_N Known) Method in the way that expected posttest performance is derived. The approach of both of these local norm methods in expressing gains on the NCE scale is also the same; that is, the standard deviation of a nationally representative sample is used in order to convert gains to NCES. When a test has only local norms, however, this standard deviation must be estimated. The denominator of Local Norm (SD_N Estimated) Method does this by considering the ratio of the treatment group standard deviation to that of the national norm group on the nationally normed test. The Local Norm (SD_N Estimated) Method assumes that the ratio of the standard deviations of these two groups on the locally normed test is the same as on the nationally normed test. In this way, the national standard deviation on the locally normed test can be estimated.

Method 3: The Chicago Method

Method 3 has been suggested by the CBE as a good estimate of NCE gains, even though it does not attempt to equate functional level results to on-level estimates via the usual percentile method, nor does it relate locally derived scores to a national standard. The Chicago Method determines Title I gains through the formula

$$TE = O_{CSS} - E_{CSS_{pre}}$$

where

O_{CSS} = the observed posttest performance expressed in Chicago Standard Scores

$E_{CSS_{pre}}$ = the pretest Chicago Standard Score

The Chicago Method uses the pretest score in place of an expected posttest score which has been determined through the pretest percentile. The CBS considers this a good estimate of expected posttest age-level performance since examination of reading CSS across age levels at the 10th, 20th, 30th and 40th percentiles revealed no more than 1 CSS difference between any two adjacent age levels and a maximum difference of 2 CSS across all age levels.[6] This indicates that deriving expected posttest performance via the usual percentile method would make little difference in the CSS value used. Small differences in Title I gains resulting from the use of the pretest score versus the use of an expected posttest score were confirmed from the data used in this study. The Chicago Method, therefore, appears to provide a good estimate of on-level, expected posttest performance.

Since the standard deviation of the Chicago Standard Score metric is the same as that of the national NCE scale, gains derived from the Chicago Method should not differ from the two local norm methods described above. The Chicago Method provides a convenient way to calculate Title I gains using the local Chicago norms.

These three local norm methods are summarized in Table I.

Method 4: Model A 1 with National Norms

Method 4 is the usual A 1 procedure which uses national norms to determine the expected posttest performance

$$TE = O_{NCE} - E_{NCE}$$

where

O_{NCE} = the observed posttest score expressed in the NCE metric

E_{NCE} = the expected posttest score, or the pretest score expressed in the NCE metric

Model A 1 with national norms was expected to show negligible gains for Chicago Title I students since performance of the Chicago student population is expected to differ from growth demonstrated by the national norming sample.

PROCEDURE

Three methods for computing Title 1 gains when local norms are used were compared to each other and to the usual A 1 model which uses national norms. Each of the local norm methods is a variation of Model A 1. Method I is the recommended procedure for tests with both local and national norms. Method 2 is the recommended procedure for tests with only local, and not national norms. Method 3 has been suggested by CBE for use with CSS.

The 1977-78 Title I Evaluation data for Chicago students ages 9 through 13 were used to estimate gains according to the methods described above. Reading and Total Math scores from the 1971 Iowa Tests of Basic Skills, levels 9 through 14, and the 1972 ITBS Primary Battery were used. The 1977 ITBS Special Normal Curve Equivalent Norms were used in the standard A 1 Method.

Matched pre-and posttest scores were available for 18,758 students in reading and 18,533 students in math. Gains were derived from each of the four methods for the entire group of Title I students in each of the specified age groups and separately for those students scoring above and below the national 10th percentile.

RESULTS

Comparison of scores for Chicago Title I students with national norms showed that more than 60% of the students at each age level were at or below the national 10th percentile in reading, and more than 75% of the students at each age level were at or below the national 10th percentile in math. Many of these students were below the national 1st percentile. Table 2 shows the percent of students in each age group below the national 1st and 10th percentiles. Pre- and posttest means in reading and math are found in Table 3.

Reading gains derived from each method are presented in Table 4. Small differences were found among the three local norm methods for computing Title I gains. The differences in gains produced by each method ranged from .06 to 2.63 with the average of the differences .76.

Method 4, the standard A 1 procedure which uses national norms, produced gains that were noticeably different from the three local norm methods. The differences in gains produced by the usual A 1 model versus the local norm methods ranged from .66 to 5.13 with an average difference of 2.78. For all ages except 13, the standard A 1 method showed smaller gains than the local

norm methods. For ages 9 through 11, the A 1 National Norm gains were negative.

Inspection of the A 1 National Norm gains for students above and below the national 10th percentile showed that these differences were more noticeable for less able students. That is, A 1 gains for students scoring at or below the national 10th percentile were several points smaller than the gains produced by the local norm methods, particularly for students age 12 and under. With the exception of 9 year olds, the A 1 National Norm gains for students above the national 10th percentile were not, on the average, very much different than the gains produced by the other methods were from each other. Gains from each of the four methods for students above and below the national 10th percentile are presented in Table 5.

The pattern of math gains derived from the local and national methods differed from that found in reading. Differences in gains among the three local norm methods ranged from .03 to 1.78 and averaged .77. The differences between the three local norm procedures and the A 1 National Norm Method ranged from .03 to 3.41 and averaged 1.10. Although the Standard A 1 Method produced the most discrepant gains, these gains were not extremely different from gains produced by the local norm methods. Math gains are presented in Table 6.

However, large differences are evident between the math gains produced by the Standard A 1 method and the local norm methods for students scoring at or below the national 10th percentile (Table 7). The national norm method produced zero gains for all ages except 12, where the NCE gain was 1. Local norm methods produced gains which ranged from .74 to 5.57 for these students. Differences in gains produced by the national norm method versus local norm procedures were smaller for students scoring above the 10th percentile.

DISCUSSION

The results of this study pertain to two issues in the evaluation of Title I in a large urban setting. The first concerns the choice of method for deriving gains based on local norms. The second issue is that of electing to use a local norm method in place of the standard A 1 model which uses national norms. Both of these issues are closely related to the use of functional level tests when a large proportion of students score at the lower end of the national distribution. Unless functional level tests are used, test scores are likely to be at the chance level, and inappropriate for use with any set of norms.

Three methods for deriving Title I gains based on local norms were compared. Method I, the Local Norm (SD_N Known) Method, is the local norm procedure developed by RMC for use with tests that have both local and national norms. This method uses the standard deviation of the national norming sample to express gain in the NCE metric. Method 2, the Local Norm (SD_N Estimated) procedure was designed by RMC for tests with only local norms. In order for the gain to be expressed in NCE units, a test with national norms must also be administered in

order to provide an estimate of the standard deviation of a nationally representative sample on the locally normed test. Method 3, the Chicago Method, considers Title I gain to be the difference between observed and expected posttest performance, as expressed on the Chicago Standard Score Scale.

These three local norm methods yield similiar Title I gains. The Local Norm (SD_N Known) and the Local Norm (SD_N Estimated) methods are alike in two ways. Each of these methods uses the pretest percentile to determine expected posttest performance. Each method expresses Title I gains in standard deviation units using the standard deviation of a nationally representative sample in order to convert gains to the NCE metric. The two methods differ in that the national standard deviation is known in one formula, and estimated in the other. This estimation process probably explains much of the difference between gains resulting from the two methods. The Chicago Method differs from these two local norm procedures in that it uses the pretest CSS in place of expected posttest performance. This approach to specifying expected posttest performance has little effect because Chicago Standard Scores are standardized for each age cycle. The Chicago Method also differs from the two Local Norm procedures since it does not express gains in the national NCE metric.

However, the Chicago Method for computing Title I gains can be rewritten in terms of individual and age cycle grade equivalent scores, as in the formula for computing CSS given in the introduction to this paper. When this is done the formulas for NCE gains and CSS gains are identical, except that the CSS scale uses the standard deviation for the Chicago age cycle, in place of the grade level standard deviation of a nationally representative sample. To the extent that these two standard deviations are the same, the CSS gain (Chicago Method) and the NCE gain (Local Norm (SD_N Known) or Local Norm (SD_N Estimated)) will be the same. Comparisons of these two standard deviations may be found in Table 8. They are similar for all age groups.

The Local Norm (SD_N Estimated) Method estimates the standard deviation of a nationally representative sample had they taken the locally normed test. Several possible local standard deviations (pretest, posttest, Title I group, Local Norm group) are available for use in this formula. For the purpose of this study, the standard deviation of the Title I treatment group, expressed in GEs and CSS, was used in keeping with the instructions in the RMC User's Guide. However, the selection of an appropriate standard deviation for use in this method will be addressed in a future study. For the Chicago data presented here, since a national sample has actually taken what is considered to be the locally normed test, the estimate of the national standard deviation in the CSS metric can be considered to be accurate. As seen in Table 8, this estimate approaches 21.06 for many age levels, emphasizing the similarity of the NCE and CSS metrics.

When this estimate is the same as the national NCE standard deviation, the Local Norm (SD_N Estimated) formula becomes $O_{CSS} - E_{CSS}$, or the Chicago Method.

Although small differences were found among gains produced by the three local norm methods, the Local Norm (SD_N Known) and the Local Norm (SD_N Estimated) procedures provide more precise estimates of national NCE gains than the Chicago Method because the standard deviation of the Chicago students is not exactly the same as that of a national sample. The Local Norm (SD_N Estimated) procedure is not necessary when local norms are developed for a nationally normed test. Therefore, the Local Norm (SD_N Known) Method appears to be the most useful method for estimating national NCE gains for Chicago Title I students.

The standard A l method which uses national norms produced gains which are different from those derived by any local norm method. The difference between the national method and the local methods is in the way that expected posttest performance is derived. Expected posttest performance is determined either through national or local norms. When the expected growth pattern described by each of these norms is different, Title I gains derived from each will also be different. When students score at the lower end of the national distribution, and local growth expectations are different from that for a nationally representative group, two patterns for Title I gains based on national norms can be predicted. The first results from the influence of students scoring below the national first percentile. The second results from differences between national and local expectations for regular school growth.

Title I students scoring below the national first percentile can be predicted to show 0 gains when national norms are used. Even if the national norms accurately describe the Chicago students at other percentiles, the mean Title I gain would be deflated due to the zero gains of these first percentile students. National Norm NCE gains of zero did appear in Math for students at or below the national 10th percentile. It is in this group of students that the concentration of students at the first national percentile is highest. Total group gains in both reading and math would probably have been more influenced by the first percentile students, that is, appeared closer to zero, had individual NCEs been averaged. Instead, age cycle mean gains were converted to the NCE scale, probably reducing the influence of the first percentile students.

Although zero gains are predicted for first percentile students, negative NCE gains can be expected when Title I students score above the first percentile but do not keep pace with regular growth expected during the school year. In this case expected posttest performance is greater than observed posttest performance. The use of national norms to specify expected performance leads to this situation for Chicago students, even when locally-derived expected performance shows Title I gains. This situation suggests that national norm group performance is an inappropriate standard for students from a large, urban setting due to dissimilar-

ities between the local and national populations. Differences in gains produced by all three local norm methods versus the national norm method suggest that such discrepancies occur especially for younger students and students below the national 10th percentile. Judging from Chicago gains, local and national performance expectations are similar for older and more able students.

CONCLUSION

The use of local versus national norms in determining expected posttest performance leads to differences in Title I gains derived under Model A 1 for students from a large urban setting. When most of the Title I students score at or below the national 10th percentile, the A 1 National Norm Method yields NCE gains which are smaller than those produced by local norm methods. For many age groups, Model A 1 with national norms leads to negative gains.

The use of local norm models is advocated in deriving Title I gains for large urban settings since local norms provide a more accurate estimate of regular school growth. The three methods compared in this study yield similar Title I gains and could be used interchangeably. The Chicago Method, which capitalizes on the features of the Chicago Standard Score, provides a convenient way to estimate Title I gains but does not express gains in the national NCE metric. However, since the CSS scale is similar to the NCE scale, the consequences of this are small. The Local Norm (SD_N Known) and Local Norm (SD_N Estimated) Methods involve use of the pretest percentile to specify expected posttest performance, and convert gains to the NCE scale. Since it is unnecessary to estimate the national standard deviation when a test has both local and national norms, the Local Norm (SD_N Known) Method is recommended as the procedure which yields good estimates of NCE gains suitable for aggregation in the evaluation of Title I.

NOTES

1 Rice, W. Norms for the Chicago Title I Evaluation, Chicago Board of Education, March, 1977, p. 2-3

2 Wick, J.W. and Ward, F. Testing students at functioning reading level: A two-year report from Chicago. Chicago Board of Education, p. 6

3 RMC Research Corporation, User's Guide, ESEA. Title I Evaluation and Reporting System, January, 1978, p. 44-54

4 RMC Research Corporation, p. 111.

5 Ibid., p. 113

6 Rice, p. 4

TABLE 1

LOCAL NORM METHODS SUMMARY

Method 1: Local Norm (SD_N Known)

Formula:

$$TE = \frac{O_{SS} - E_{SS}}{SD_N} \times 21.06$$

where

TE = Treatment Effect

O_{SS} = Observed Posttest score (standard score metric)

E_{SS} = Expected Posttest score (standard score metric)

SD_N = standard deviation of the national norm group

Use:

Tests which have both local and national norms

Features:

1. Expected posttest performance determined by pretest percentile through local norms.
2. Test publisher's national norm group standard deviation enables conversion of gain to NCE metric.

Method 2: Local Norm (SD_N Estimated)

Formula:

$$TE = \frac{O_{CSS} - E_{CSS}}{(SD_N \times SD_{TCSS})/SD_{TN}} \times 21.06$$

where

TE = Treatment Effect

O_{CSS} = Observed Posttest Chicago Standard Score

E_{CSS} = Expected Posttest Chicago Standard Score

SD_N = standard deviation of the national norm group

SD_{TN} = the standard deviation of the treatment group on a nat. normed test

SD_{TCSS} = the standard deviation of the treatment group in the CSS metric

Use:

Tests with only local norms

Features:

1. Expected posttest performance determined by pretest percentile through local norms.
2. Additional test with national norms must be given.
3. Estimated national standard dev. enables conversion to NCE.

Method 3: The Chicago Method

Formula:

$$TE = O_{CSS} - E_{CSS_{pre}}$$

where

TE = Treatment Effect

O_{CSS} = Observed Posttest Chicago Standard Score

$E_{CSS_{pre}}$ = the pretest Chicago Standard Score

Use:

Chicago Standard Scores

Features:

1. Uses pretest score instead of pretest percentile.
2. Expresses gain in local rather than national NCE metric.

TABLE 2

Percent of Title I Students at or below the
National 1st and 10th Percentiles

READING

Age at Posttest	N	Percent at 1st Percentile	Percent at or Below 10th Percentile
9	3139	6.4	62.8
10	3868	10.6	65.9
11	4082	12.6	68.7
12	4103	14.9	71.4
13	3516	17.0	72.7

MATH

Age at Posttest	N	Percent at 1st Percentile	Percent at or Below 10th Percentile
9	3087	16.5	75.5
10	3830	23.4	73.9
11	4045	27.3	75.5
12	4052	29.8	76.1
13	3519	34.9	79.6

TABLE 3

Reading and Math Pre- and Posttest Means
for Chicago Title I Students, 1977-1978

Reading

Age at Posttest	Pretest CSS	Posttest CSS	Pretest GE	Posttest GE
9	234.94	236.61	2.57	3.10
10	237.03	237.56	3.13	3.70
11	237.41	239.17	3.68	4.37
12	237.08	239.42	4.19	4.99
13	236.06	239.45	4.64	5.63

Math

Age at Posttest	Pretest CSS	Posttest CSS	Pretest GE	Posttest GE
9	237.43	240.63	2.42	3.18
10	238.42	240.48	3.04	3.82
11	238.27	240.19	3.65	4.47
12	238.14	239.61	4.29	5.12
13	236.50	239.09	4.82	5.63

TABLE 4

Reading NCE Gains Derived from Different Methods
for Chicago Title I Students

Age at Posttest	N	Method 1: Local Norm (SD_N Known)	Method 2: Local Norm (SD_N Estimated)	Method 3: Chicago Method[1]	Method 4: A 1 National Norm
9	3139	2.07	2.13	1.67	-3
10	3868	-0.43	0.30	0.53	-2
11	4082	2.53	2.11	1.76	-1
12	4103	4.21	4.97	2.34	3
13	3566	3.22	4.10	3.39	6

[1] Gains produced by this method are in the local NCE metric.

TABLE 5

Reading NCE Gains for Students
Above and Below the National 10th Percentile

Age at Posttest	N		Method 1: Local Norm (SD_N Known)		Method 2: Local Norm (SD_N Estimated)		Method 3: Chicago Method[1]		Method 4: A 1 National Norm Method	
	≤ 10th %tile	> 10th %tile	≤ 10th %tile	> 10th %tile	≤ 10th %tile	> 10th %tile	≤ 10th %tile	> 10th %tile	≤ 10th %tile	> 10th %tile
9	1970	1169	0.48	1.44	0.72	1.30	0.74	1.45	-2	-4
10	2550	1318	0.87	0.87	0.90	1.26	0.83	1.19	-3	1
11	2804	1278	0.67	3.87	0.30	5.00	0.25	3.94	-5	2
12	2928	1175	3.59	1.47	4.29	1.24	3.34	1.05	3	2
13	2592	974	5.18	2.65	4.05	4.34	3.40	3.69	6	5

1 Gains produced by this method are in the local NCE metric.

TABLE 6

Math NCE Gains Derived from Different Methods for Chicago Title I Students

Age at Posttest	N	Method 1: Local Norm (SD_N Known)	Method 2: Local Norm (SD_N Est.)	Method 3: Chicago Method [1]	Method 4: A 1 National Norm Method 4
9	3087	2.68	3.92	3.20	2
10	3830	2.19	2.22	2.06	2
11	4045	2.66	1.60	1.92	3
12	4052	3.03	2.35	1.47	3
13	3519	3.77	4.37	2.59	6

[1]Gains produced by this method are expressed in the local NCE metric.

TABLE 7

Math NCE Gains for Students Above and Below
the National 10th Percentile

Age at Posttest	N		Method 1 Local Norm (SD_N Known)		Method 2 Local Norm (SD_N Estimated)		Method 3 Chicago Method[1]		Method 4 A 1 National Norm Method	
	≤ 10th %tile	> 10th %tile	≤ 10th %tile	> 10th %tile	≤ 10th %tile	> 10th %tile	≤ 10th %tile	> 10th %tile	≤ 10th %tile	> 10th %tile
9	2332	755	5.57	1.44	5.50	0.59	4.22	0.45	0	-1
10	2829	1001	2.58	2.38	2.64	2.16	1.72	1.40	0	4
11	3055	990	4.17	2.47	3.69	0.94	2.19	0.56	0	0
12	3084	968	0.89	3.21	1.26	2.26	0.74	1.32	1	3
13	2802	717	5.03	3.14	4.24	4.35	2.87	2.65	0	2

[1] Gains produced by this method are in the local NCE metric.

TABLE 8

Local and National Standard Deviations
in Grade Equivalent and CSS Units

Reading

Age at Posttest	Grade Equivalent		CSS	
	Local	National	Local	National [1]
9	.97	1.32	15.71	21.38
10	1.13	1.46	15.00	19.38
11	1.35	1.58	15.10	17.67
12	1.50	1.70	14.43	16.35
13	1.60	1.83	14.82	16.95

Math

Age at Posttest	Grade Equivalent		CSS	
	Local	National	Local	National [1]
9	.90	1.02	14.17	16.06
10	1.05	1.06	13.62	13.74
11	1.26	1.11	14.17	12.48
12	1.38	1.18	14.50	12.39
13	1.43	1.34	14.51	13.60

[1] Standard deviation of a nationally representative sample in CSS units as estimated in Method 2.